

Engineering Design and Development 21007

Rationale Statement:

This capstone course allows students to design a solution to a technical problem of their choosing. They have the chance to eliminate one of the “Don’t you hate it when…” statements of the world. This is an engineering research course in which students will work in teams to research, design, test and construct a solution to an open-ended engineering problem. The product development life cycle and a design process are used to guide and help the team to reach a solution to the problem. The team presents and defends their solution to a panel of outside reviewers at the conclusion of the course. The EDD course allows students to apply all the skills and knowledge learned in previous Project Lead The Way courses. The use of 3D design software helps students design solutions to the problem their team has chosen. This course also engages students in time management and teamwork skills, a valuable set for students in the future. This course is designed for 12th grade students.

Suggested grade level: Grades 12

Topics covered:

Problem identification
Conduct product research
Decision process
Design a prototype
Build a prototype
Prototype testing
Presenting prototype and results

Indicator #1: Introduction to problem statement	
Webb’s Leveling	Standard and Examples
Skill/Concept	EDD1.1 Brainstorm problem statements for unique innovations
Skill/Concept	EDD1.2 Write concise problem statements using technical writing skills
Skill/Concept	EDD1.3 Speak to experts appropriately
Skill/Concept	EDD1.4 Ask valid questions about potential solutions
Skill/Concept	EDD1.5 Write about the identified problem
Indicator #2: Product research	

Webb's Leveling	Standard and Examples
Skill/Concept	EDD 2.1 Synthesize case studies regarding research and development
Skill/Concept	EDD2.2 Create market research to determine the merit of the solution.
Skill/Concept	EDD 2.3 Self-assess performance based on the goals for developing a solution to a problem
Strategic Thinking	EDD 2.4 Use a list of specifications identified in a decision matrix to develop a list of alternative solutions to the stated problem
Strategic Thinking	EDD 2.5 Identify patents related to their identified problem
Strategic Thinking	EDD 2.6 Conduct research determine the merit the solution based on past solutions to the problem
Indicator #3: Decision process	
Webb's Leveling	Standard and Examples
Skill/Concept	EDD3.1 Create a description of the product specifications for the design solution
Strategic Thinking	EDD3.2 Evaluate proposed design solutions using specific criteria
Strategic Thinking	EDD3.3 Graphically represent the results of the design solution evaluation
Indicator #4: Prototype design	
Webb's Leveling	Standard and Examples
Skill/Concept	EDD4.1 Sketch all parts of their design solution including an isometric view of the assembled product
Skill/Concept	EDD4.2 Create a set of working drawings for their design solution
Strategic Thinking	EDD4.3 Interpret the feedback they receive from experts to improve their design solution
Strategic Thinking	EDD4.4 Refine their design solution, if necessary, based upon expert feedback
Indicator #5: Prototype construction	
Webb's Leveling	Standard and Examples

Skill/Concept	EDD5.1 Create a detailed set of instructions for producing a testable prototype based on the information gained through their research
Skill/Concept	EDD5.2 Identify methods and sources for obtaining materials and supplies
Skill/Concept	EDD5.3 Compile a materials list that includes vendors and cost for all necessary materials and equipment to build their prototype
Strategic Thinking	EDD5.4 Write a step-by-step procedure for the assembly of their prototype
Indicator #6: Prototype testing	
Webb's Leveling	Standard and Examples
Skill/Concept	EDD6.1 Select a valid testing method that will be used to accurately evaluate their design solution's ability to solve their problem
Skill/Concept	EDD6.2 Prepare a description of the testing method that will be used to valid the designed solution
Skill/Concept	EDD6.3 Devise a list of testing criteria that will be used to evaluate the success or failure of their prototype testing
Strategic Thinking	EDD6.4 Apply the appropriate statistical analysis tools to the test results to ensure validity
Strategic Thinking	EDD 6.5 Evaluate the effectiveness of their design at solving the problem they have defined
Indicator #7: Prototype presentation	
Webb's Leveling	Standard and Examples
Extended Thinking	EDD7.1 Create a technical research paper
Extended Thinking	EDD7.2 Present an effective technical presentation on the chosen design solution